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From: Carolyn Kossik/SEA
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Attn: Kaia Peterson

Date: February 1, 2001

Re: Reichhold Tacoma

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2	Reichhold Tacoma Site – Revised CAMU Summary, dated January 2001

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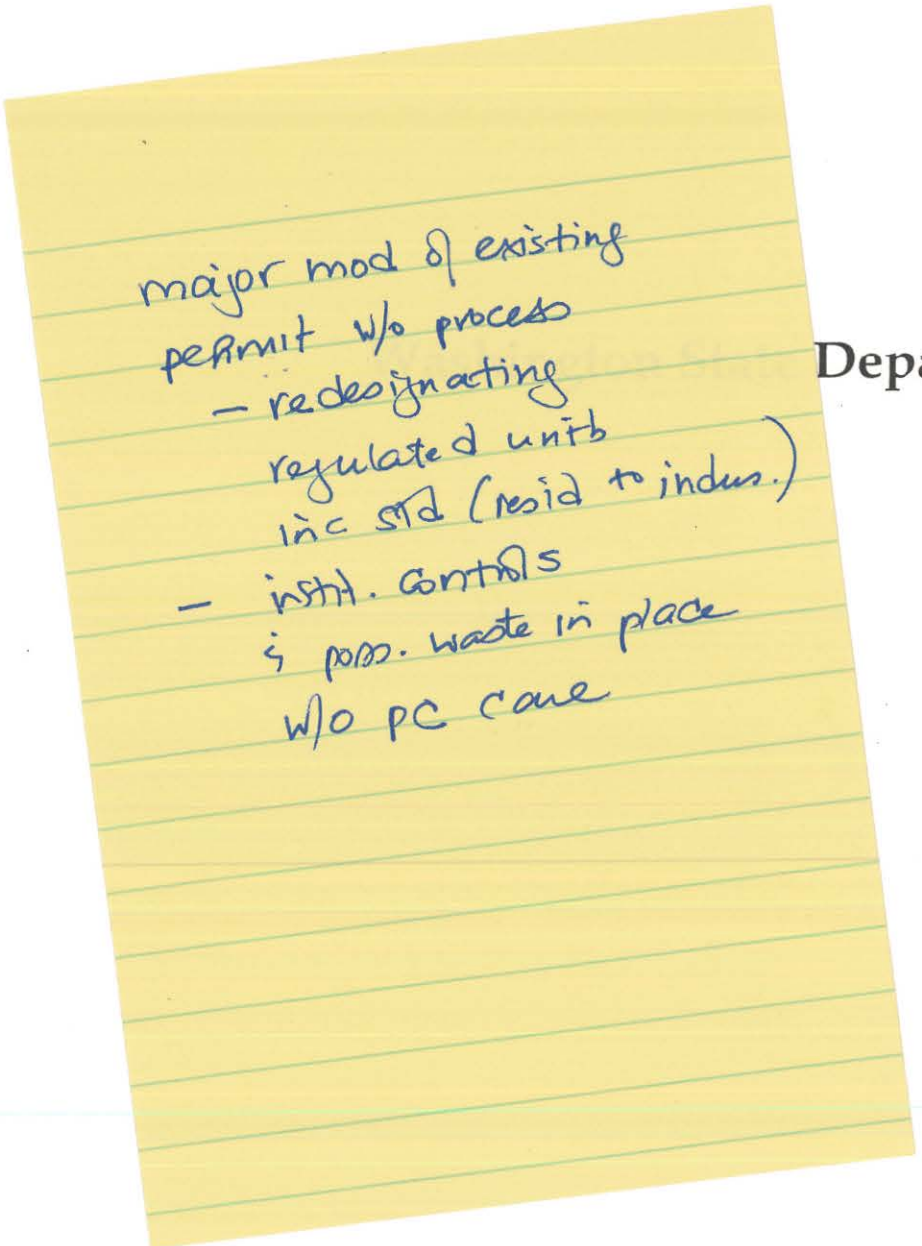
Reichhold, Inc.

Technical Summary

RCRA Corrective Action Management Unit Summary



Prepared for

Department of Ecology

Southwest Regional Office
Olympia, WA

January 2001

Reichhold, Inc.
3320 Lincoln Avenue
Tacoma, WA 98421

RCRA Corrective Action Management Unit Summary

Submitted to

Washington State Department of Ecology

January 2001

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Reichhold Tacoma Site

RCRA Corrective Action Management Unit Summary

1.0 Introduction and Purpose

WAC 173-303-646(5) CAMU Designation
WAC 173-340-430 (6)(a) MTCA Interim Action Description

The following information has been assembled to create a summary of the Corrective Action Management Unit (CAMU) that will be included in the Corrective Action Agreed Order for Reichhold, Inc.'s Tacoma Site. The components of this summary correspond to specific Dangerous Waste Regulations (Chapter 173-303 WAC) and the Model Toxics Control Act Cleanup Regulation (MTCA) (Chapter 173-340 WAC) requirements identified by Ecology during our meetings on August 16, 2000 and September 26, 2000 that should be included and/or discussed in this summary.

On October 20, 2000, Reichhold submitted a draft application for a CAMU determination entitled "Reichhold Tacoma Site, RCRA Corrective Action Management Unit Summary." Ecology reviewed the application and, in a letter dated November 22, 2000, determined that the draft application was substantially complete and that the draft application addressed the main elements of CAMU designation that concern long-term effectiveness, including location of the CAMU, wastes proposed for management, technical design elements, and description of treatment."

The proposed CAMU amendments published by EPA on August 20, 2000 put forward an approach for grandfathering CAMUs for which substantially complete applications were submitted on or before ninety (90) days after publication of the proposed amendments (§§ 264.550 and 264.551). Because Reichhold's substantially complete application was submitted within 90 days after publication of the proposed CAMU amendments, the CAMU proposed by Reichhold would remain subject to the 1993 CAMU regulations [58 FR 8658] following final issue of the proposed CAMU amendments. To continue to operate pursuant to the requirements of the 1993 CAMU regulations, the CAMU established under the agreed interim action administrative order (order) must operate within the general scope of this order, including the type of waste, waste management activities, and design of the CAMU. If the CAMU changes in a way that exceeds the general scope of this order, those changes must be implemented in accordance with the final CAMU amendments.

Since 1986, Reichhold has performed extensive investigation and remediation activities at its Tacoma site under the RCRA Corrective Action Program. These actions have been implemented with the support of EPA Region 10 (EPA) and the Washington State Department of Ecology (Ecology) under a RCRA Storage and Corrective Action Permit administered by EPA Region 10. Reichhold would like to continue its RCRA Corrective

Action responsibilities by using the most innovative regulatory and technical tools available to ensure it is achieving the Corrective Action goal established by Ecology for the site, namely:

> *"To clean up the site in the most efficient and cost effective manner so as to allow Reichhold to put the property back into use and/or sell all or portions of it". (Ecology, February 16, 2000)*

Soil cleanup is a major element of the Corrective Action Program at the Tacoma site. As explained below, Reichhold has successfully used the provisions established for a Corrective Action Management Unit (CAMU) to conduct effective soil cleanup actions. Continued reliance on a CAMU will let Reichhold continue the soil cleanup at the Tacoma site in the most efficient and protective means possible because it facilitates controlled excavation and consolidated treatment of soils onsite. This onsite treatment provides a more permanent cleanup action by detoxifying site contaminants. Continued use of a CAMU will ensure the most effective implementation and timing of remedial actions for the site.

In WAC 173-303-646 (Corrective Action), the Dangerous Waste Regulations establish criteria for designating a CAMU and define operating elements that are incorporated in a permit or order. In WAC 173-340-430 (Interim Actions), the Model Toxics Control Act Cleanup Regulation describes how certain interim actions may occur prior to the completion of a cleanup action. Ecology has determined that establishment of a CAMU is subject to the state's Dangerous Waste Regulations and it will be considered a MTCA Interim Action. As a result, Reichhold must prepare a summary that meets applicable requirements of both regulations. This summary has been prepared to describe how Reichhold proposes to configure and operate the CAMU at the Tacoma site to promote our ongoing corrective action program.

2.0 Background and Rationale for CAMU

WAC 173-303-646(5)(a)(i) CAMU Designation and the implementation of reliable, effective, protective and cost-effective remedy
WAC 173-340-430 (6)(b)(i) and (ii) MTCA Interim Actions-description of existing site conditions and why alternative selected

2.1 Existing Site Data

Reichhold began manufacturing operations at the Tacoma site in 1956. The plant commenced shutdown activities in 1985 beginning with the former Pentachlorophenol Plant Area and completed operational closure in 1990. Attachment 1 and Attachment 2 provide a description of the plant, it's historic manufacturing operations, and the cleanup activities completed to date under the RCRA Corrective Action program.

2.2 Why a CAMU is Preferable for the Tacoma Site's Corrective Action

To date, Reichhold has performed numerous remedial actions at the Tacoma site that have resulted in controlling migration of contaminated groundwater, reducing potential human and environmental exposures to contaminated media, and reducing the volume of

contaminants present in the site soils and groundwater. Some of Reichhold's remediation wastes are designated by the RCRA Permit as listed hazardous waste (FO21)[1] and are subject to RCRA land disposal restrictions (LDR's). All of the soil remedial actions completed since 1988 have been enabled and enhanced by the use of some specific and unique features of Reichhold's RCRA Permit which effectively allowed activities the same as if a CAMU was designated. At the time Reichhold's RCRA Permit was issued (1988), EPA and Ecology recognized the significant benefits of incorporating the impending CAMU provisions into this permit. As a result, the Tacoma site's permit contains many of the same operational provisions that were eventually incorporated into the final (1993) CAMU rule. These are referred to (in the 1988 permit) as the Hazardous Waste Management Area (HWMA) requirements.[2]

Without the flexibility afforded by the permitted HWMA provisions (and that which the 1993 CAMU rule now provides), none of the site soil corrective actions could have been completed. In order for Reichhold to continue and complete ongoing site soil remediation activities, (movement of soils containing listed hazardous waste remains necessary), a CAMU is essential. Designation of the HWMA has ensured, and designation of the CAMU will ensure, that ongoing and planned soil remediation activities occur quickly and effectively.

To assist in the cleanup of site-wide soil, selected contaminated soil removals are planned. Reichhold has identified the remaining areas of the site that have soils constituent concentrations in excess of applicable soil cleanup levels. These areas are targeted for excavation and treatment. This source removal effort will protect and contribute to ongoing groundwater cleanup efforts. The CAMU at the Tacoma site will also facilitate the implementation of a final site remedy for soils by allowing Reichhold to move contaminated soil within a controlled designated area of the site (the CAMU) without triggering LDRs which would otherwise unnecessarily constrain and delay site cleanup. Finally, the use of the CAMU encourages onsite treatment by innovative soil cleanup technologies; a cleanup action that satisfies MTCA's preference for permanent remedies.

Source removal at the Tacoma Site begins with the removal (excavation) of contaminated soil areas. The current technology applied at the site to soils after excavation is to place the soils in a protective onsite treatment system – that consists of fully engineered and lined cells. The soil contaminants are treated onsite by innovative detoxification technologies. Cells within the treatment system are designed to provide soil flushing and leachate collection capabilities as well as facilitate the use of effective biological amendments that are applied, as necessary. When soils have achieved their targeted treatment level, they will be placed in an area outside of the soil cells but within the CAMU. At that point in time, the soils will have met their cleanup levels.

This remedial approach is protective of human health and the environment. It is also much more cost effective in comparison to the alternative of offsite incineration of soil, the only

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[1] The designation of the soils from certain areas of the site as F021 is currently being reassessed to include information that was unavailable at the time of the original designation.

[2] The HWMA was so authorized because Reichhold's RCRA Permit was issued prior to finalization of the CAMU rule (February 1993).

alternative for the RCRA listed hazardous waste F021 and media designating as containing F021. The designation of a CAMU for the Tacoma site allows Reichhold to implement more soil corrective actions more quickly and protectively, and much more cost effectively. It also represents a much wiser reuse of soil and avoids wasteful and pointless disposal. This means Reichhold can complete cleanup of the Tacoma site in concert with Ecology's stated goal for the Tacoma site.

3.0 Site Description

WAC 173-303-646(5)(b)(i) Areal configuration of CAMU
WAC 173-303-646(5)(a)(iii) Including uncontaminated areas in CAMU
WAC 173-340-430(6)(b) Applicable MTCA RI/FS elements

Figure 1 presents the configuration of the CAMU proposed for the Reichhold Tacoma site. The CAMU is located within the contiguous property under the control of Reichhold. Only one CAMU is requested for the site.

Historic manufacturing occurred over the entire area included within the CAMU boundary. These areas have been characterized and are known to have detectable levels of hazardous constituents. The CAMU also contains regulated (i.e., permitted) hazardous waste management units or areas which have been previously the subject of corrective actions. No uncontaminated (i.e., areas meeting MTCA Method B values using residential exposure standards) areas of the facility are included in the CAMU.

4.0 Design and Operation of the CAMU

WAC 173-303-646(5)(b)(ii) Applicable design, operation and closure requirements
WAC 173-340-430 (6)(c) Design and construction requirements

The CAMU covers approximately 22 acres of the 52 acre Tacoma site. This CAMU is reduced in size by approximately 40% from the HWMA/CAMU currently in use at the site as designated by the site RCRA Permit. Approximately 50% of the CAMU is covered with an engineered site cover which was installed in October 1990. The intent of this site cover is to prevent offsite migration of hazardous constituents through surface water, reduce infiltration to groundwater and to prevent run-on of surface water from offsite. The site cover consist of two materials: (1) a 6-inch lift of granular base placed and compacted, then paved with a minimum of 2 inches of asphaltic concrete or (2) gravel. Each of these materials was used for construction in different areas of the CAMU.

The CAMU is surrounded by a hydraulic containment system for the groundwater and is comprised of three components:

1. A shallow interceptor drain (SID) that was installed in 1989 around the perimeter of the facility where manufacturing operations were conducted. The SID intercepts and collects groundwater from the shallow aquifer which is pumped to the water treatment system for treatment. The SID prevents shallow groundwater from leaving the site.

2. An operating groundwater extraction and collection system that has been engineered and designed to work with a treatment system that remediates the intermediate aquifer in the vicinity of the Reichhold site. This system consists of eight extraction wells located onsite (operational since 1989) and offsite (operational since 1992). The collection system is positioned in areas where contaminated groundwater was encountered.
3. A water treatment system (WTS) exists at the site that was designed and installed at the site for treatment of the extracted groundwater. The WTS is a state-of-the-art system that destroys organic compounds (i.e., chlorinated phenol compounds). It has been operational since 1990 and was upgraded in 1992 to meet the hydraulic capacity of the onsite and offsite extraction systems.

These three components describe the current groundwater system. This system may change in the future and is subject to Ecology review and approval.

Additionally, numerous interim actions/measures have been conducted at the facility as described in Attachment 2. The implementation of the RCRA corrective action activities at the Reichhold Tacoma facility has been interactive with the Agencies prior to, during, and after the 1988 RCRA Permit was issued. Construction details for each of the interim measures have been provided in the construction certification packages previously submitted to EPA Region 10 and Ecology and have also been documented in the required annual reports for the site under the RCRA Permit.

Portions of the CAMU have been left unpaved to facilitate the implementation of soil remediation activities and technology evaluation efforts. Within this area, Reichhold has designed, constructed and currently operates two engineered soil cells for the reduction in concentration of hazardous constituents in the excavated soils (see Figure 1). These soil cells contain soils which have been excavated for source removal at the site. It is expected that source removal will enhance the results of the groundwater corrective action effort. Reichhold targeted five areas of the site for source removal based on investigation and sample analysis results from several events at the facility. These five areas are the former Pentachlorophenol Plant, the North Extension Area, the Main Disposal Area, the Construction Debris Area, and the former Resin Tank Farm. Approximately 20,000 cubic yards of soil is anticipated to be excavated and placed in the soil cells for treatment.

Once soils from the cells have achieved the targeted treatment levels, they will be removed from the cells and placed in the unpaved portion of the CAMU as noted on Figure 1. The unpaved area of the CAMU is fenced and posted with warning signs. Refer to Section 4.1 of this summary for further information on the soil cells design and operations.

Ecology is in the process of reviewing historical process knowledge and analytical data submitted by Reichhold to determine if all potential constituents of concern have been identified. Upon completion of Ecology's review, Ecology and Reichhold will agree on a list of site constituents of concern. Analysis of indicator parameters in lieu of specific constituents may be approved by Ecology if Reichhold demonstrates that these parameters can provide accurate information on the effectiveness of treatment.

4.1 Soil Cells

The current design and operating practices of the soil cells is expected to continue unchanged within the CAMU designated by Ecology in the renewed RCRA Permit/Corrective Action Order.

Engineering Design. Attachment 3 presents the design and construction drawings for the onsite soil cells. Each cell is constructed on a 1-foot layer of screened imported fill that provides a smooth foundation for the liner system. The three-layer liner system of each cell consists of a geosynthetic clay liner placed directly on the lining foundation, followed by two polypropylene geomembrane layers. All exposed portions of the liner are covered with an imported, screened fill placed along the top of the surrounding berms and a minimum of one foot of uniformly graded drainage sand within the cells. Because moisture is an integral part of maintaining optimal conditions for any bioamendment effort, an irrigation system is available within each cell to provide a ready supply of water. Leachate generated by infiltrating storm water and irrigation water is contained in the cells and collected by the cell's leachate collection system. This system is designed to control the water volume resulting from a 25-year storm event. The leachate collection system consists of six inch PVC pipes within the drainage sand layer of each of the cells. These pipes then drain to the leachate sump manholes which are installed with 90 gallon per minute submersible pumps. The sump manholes are located on the eastern edge of each of the cells and pump the collected leachate to Reichhold's Water Treatment System (WTS). Precipitation and other water that runs off the soil and collects within the bermed treatment cells is also collected and directed to the onsite WTS.

Use of Innovative Technology. As stated above, the onsite engineered soil cells are located within the CAMU. Their function is to reduce the toxicity and volume of remediation wastes that will remain in place after closure of the CAMU. Reichhold has completed evaluations of numerous remedial technologies for soils during the course of the current RCRA Permit. It was concluded that a soil flushing/bioremediation technology project is the most innovative of the currently effective and available methods to remediate the site soils contaminated with chlorinated phenols present at the Tacoma site. This estimation is supported by the fact that comparable technologies have been evaluated and accepted in EPA's Superfund Innovative Technology Evaluation (SITE) Program. An additional constituent of concern in some of the site soils targeted for remediation are polychlorinated biphenyls (PCBs). Reichhold continues to review available technologies to implement onsite for the treatment of PCBs in these excavated soils.

The current technology being utilized by Reichhold in the onsite soil cells is a commercial soil amendment developed by Grace Bioremediation Technologies - Daramend™ Bioremediation Technology. This product was evaluated in EPA's Superfund Innovative Technology Evaluation (SITE) Program in late 1995. The technology is a proprietary bioremediation process that treats soil to reduce concentrations of chlorinated phenols. According to the SITE evaluation report:

> The Daramend™ Bioremediation Technology is an effective alternative to soil washing, incineration or landfilling soils containing high levels of polynuclear aromatic hydrocarbons (PAHs) and chlorinated phenols, including pentachlorophenol (PCP). (Richardson, T., EPA National Risk Management Research Laboratory from *Tech Trends* November 1995)

The technology provides short and long-term protection because it provides irreversible treatment of PAHs and total chlorinated phenols (TCPs) by eliminating these contaminants from the soil, thus preventing further ground water contamination and pollutant migration. (Richardson, T., EPA National Risk Management Research Laboratory from *Tech Trends* November 1995)

Conclusions Based on Primary Objectives. The Daramend™ Bioremediation Technology achieved an overall 88% reduction of TCPs (with a 90% confidence interval of 82.9% to 90.5%) after 254 days of treatment of the Treatment Plot *ex situ* soils. Total TCPs were reduced from an average of 352 mg/kg to 43 mg/kg (*Grace Bioremediation Technologies Daramend™ Bioremediation Technology*. Superfund Innovative Technology Evaluation (SITE) Report, EPA/540/R-95/536 July 1996).

The findings of this SITE demonstration project are supported by several complementary observations, all of which demonstrate that the contaminants were removed by the Daramend™ Bioremediation Technology. These include 1) a statistical analysis of the first and last sampling episodes that indicate significant decreases in total PAHs and PCP; 2) intermediate measurements that show steadily declining values for these contaminants; 3)a marked decrease in total recoverable petroleum hydrocarbons (TRPH) over the duration of the test; 4) decrease in toxicity as measured by earthworms and seedling bioasssays; and 5) bacterial plate counts that illustrate enhanced activity in the Treatment Plot. Taken together these observations are more convincing than any single set of data considered separately. (*Grace Bioremediation Technologies Daramend™ Bioremediation Technology*. Superfund Innovative Technology Evaluation (SITE) Report, EPA/540/R-95/536 July 1996)

The DARAMEND ™ technology enhances and promotes natural bioremediation rates by adjusting conditions in a soil to stimulate biodegradation of organic compounds. Laboratory treatability studies conducted on soils obtained from the Tacoma site by Grace Bioremediation Technologies showed promising results. Specifically, for the samples studied, total chlorinated phenols were reduced by 96% or more in response to each Daramend application. The treatment timeframe in this lab study was 77 days. At the same time, evidence of significant mineralization of C-PCP was detected. This observation suggests that complete degradation of the chlorinated compounds' to innocuous constituents (carbon dioxide and water) is the major fate of contaminants. Reichhold and Grace Bioremediation Technologies believe this technology is sufficiently promising and innovative to merit application at the Tacoma site.

Attachment 4 contains the complete EPA SITE Program Innovative Technology Evaluation Report for the Daramend™ Bioremediation Technology. Continued use of this technology at the Tacoma site reduces the mobility, toxicity, and volume of wastes that will remain in place after closure of the CAMU.

In addition to the Grace product, Reichhold continues to research and, consider testing, promising innovative technologies that may accelerate the overall treatment of contaminants (including chlorinated phenols) at the Tacoma facility. If Reichhold plans to implement an alternate innovative soil technology for evaluation, Reichhold will submit a proposal to Ecology for review and approval of the alternate technology. After the technology is evaluated in the field, Reichhold will determine if the technology is useful at the site to achieve the corrective action goals and warrants application on a larger scale.

Current Innovative Technology Implementation at the Tacoma Site. Attachment 5 contains a description of the process and activities for application of the Daramend technology to the Reichhold Tacoma site soils placed into the engineered soil cells. Based on previous investigation results, five areas of the site have been identified for soil source removal where soils contain constituent concentrations above the site soil cleanup levels: 1)

the former Pentachlorophenol Plant, 2) the North Extension Area, 3) the Main Disposal Area (MDA), 4) the Construction Debris Area (CDA), and 5) the former Resin Tank Farm

The order in which the five defined areas are to be excavated is based on the redevelopment priorities for the site. For real estate purposes, the site has been divided into three parcels – A, B, and C. Parcel A is the area of the site where no manufacturing activities were conducted. Parcel B is the former main manufacturing area of the site. Parcel C is the area of the site associated with manufacturing and is where the MDA and CDA are located. In terms of preparing the site for redevelopment, Parcels A and B have been targeted for redevelopment first since the longer term soils and groundwater treatment activities are located on Parcel C. Investigation and corrective action activities have been conducted previously on Parcel A in 1990. Identified soils from the two areas on Parcel B (the former Pentachlorophenol Plant and the North Extension Areas) have been excavated and placed in the soil cells in 1997. Further soil excavation is scheduled to be completed in the former Pentachlorophenol Plant area, the Construction Debris Area, and the former Resin Tank Farm area once treatment is completed of soils currently in the soil cells (i.e., achieved the contained-out determination). Treated soils can then be removed from the cells for placement onsite and the remaining soils excavated and placed in the cells for treatment. Currently Cell 3 holds soils from the former Pentachlorophenol Plant; and Cell 4 holds soils from the North Extension , Unit 49 (Offsite Drum Storage Area), and Unit 12 (Septic Tank Area). Unit 49 and Unit 12 soils were excavated in 1990, during corrective action activities, and held onsite until they were transferred to Cell 4 in 1997.

Once the soils have met the targeted treatment levels for chlorinated phenols and other constituents of concern, they will be removed from the cells and placed in the unpaved portion of the CAMU as noted on Figure 1. The MDA and CDA are both located within this unpaved area. The MDA and CDA have been the subject of comprehensive investigation efforts in 1987 and 1994. Based on this information, soil was removed from one area of the MDA at the time of construction of the soil cells from an area which was located within the footprint of the soil cells. Based on Reichhold's review, the remaining MDA areas have met the site soil cleanup levels as defined by the RCRA Permit. The soils in the CDA have been identified for removal as described in the preceding paragraph.

Ecology has defined a soil contained-out level for pentachlorophenol of 79 ppm (see Attachment 7) since the soils from several areas of the site currently are designated by the RCRA Permit as containing F021. Per Attachment 7, Reichhold will treat the permit designated F021 soils until the concentration of pentachlorophenol is 79 ppm. Then Reichhold will continue to treat the soils for up to one additional year or until the concentration of pentachlorophenol is 20 ppm, whichever comes sooner. Ecology will then review the analytical results of baseline and verification sampling of the targeted soil horizon. Ecology will also review the analytical results of soil sampling in locations the facility is planning to place treated soils. Reichhold must demonstrate to Ecology that adequate sampling has occurred in these areas prior to removing treated soils from the treatment cells and placing treated soils on the ground. No treated soils may be removed from the treatment cells without Ecology's prior approval. After reviews of these demonstrations, Ecology will issue a confirmation that the contained-out level has been

achieved and treated soils can be placed on the ground in agreed-upon locations within the CAMU.

4.2 Groundwater Monitoring System

WAC 173-303-646 (5)(b) (iii) Groundwater Monitoring
WAC 173-340-430(6)(d) Compliance Monitoring

State requirements for groundwater monitoring will be met through the continued use of the existing groundwater monitoring network, which was designed to provide a system capable of detecting and characterizing potential releases from the CAMU. The current groundwater monitoring plan is capable of detecting potential future releases from the CAMU. It has functioned effectively since Reichhold started conducting groundwater monitoring activities in 1986. Groundwater monitoring will continue under the existing RCRA Permit conditions until modified or replaced by the renewed RCRA Permit that will be issued jointly by Ecology and EPA. The groundwater monitoring program elements are defined in the RCRA Permit Renewal Application, dated June 1998. Attachment 6 contains Section E of the 1998 Renewal Application which provides an in-depth summary of the current groundwater monitoring program at the facility as well as historical programs implemented.

5.0 Health and Safety

WAC 173-303-646(5)(a)(ii) Protection from exposure to CAMU waste management activities
WAC 173-340-430 (6)(e) Health and safety plan

Unacceptable risks to humans or to the environment are controlled by site access, onsite trained staff, and engineered features. The Tacoma site is located in an area which is zoned heavy industrial by the City of Tacoma. The Reichhold site is secured by fencing and locked gates. Access is controlled by gates with access codes required for operation at all times. Implementation of the CAMU actually reduces risks to humans and the environment by allowing Reichhold to consolidate and manage all of their remediation wastes on site – instead of transporting wastes along public thoroughfares and then re-handling them at a disposal facility.

Reichhold has a successful operating record of safely completing corrective action activities since they began in 1986. There are two full time staff at the site; they are responsible for operating and overseeing existing remediation systems. Attachment 8 presents the Reichhold Tacoma site health and safety plan. During corrective action activities, Reichhold takes appropriate precautions in accordance with the WISHA regulations to minimize and control any exposure risks to workers, visitors, and to the environment from the site. For example, during soil excavation and transfer to the soil cells, appropriate dust control measures are implemented to ensure exposure to site workers is not occurring. Dust control measures during soil excavation and movement to the cells include daily watering of the haul routes during soil transfer activities. Once the soil transfer is complete and the amendment is applied to the soil in the cells, Reichhold lightly waters the soil before each

tilling event begins. Further, a key component for the amendment to be successful is to keep the soils at a high moisture content. This requires Reichhold to consistently water the soils in the cells to maintain the required moisture content which then also controls dust from the cells. The Material Safety Data Sheet for the soil amendment in current use, Daramend, is provided in Attachment 8.

Approximately 50% of the CAMU area is covered with an engineered cover system. The remaining CAMU area has been left unpaved to conduct soil remediation and technology evaluations in accordance with the RCRA Permit conditions. Source removal and soil treatment activities are anticipated to substantially reduce hazardous constituent concentrations in both soils and groundwater providing continuing protection to receptors.

Portions of the Tacoma site are leased for other commercial endeavors. Staff working on leased parcels are restricted to their respective work sites which have engineered covers or are designated as non-industrial. Unacceptable exposure risk to these workers does not occur. Employees of the lessee are notified of the ongoing site corrective action activities through their contractual obligations with Reichhold. Additionally, Reichhold conducts an initial site orientation with the lessee and provides follow-up information as needed.

Unacceptable exposure risks are also controlled by the control of surface water and groundwater throughout the facility including the CAMU via an operating hydraulic containment system for shallow and intermediate groundwater. This system is described in Section 4.0 of this CAMU summary.

6.0 Sampling and Analysis Plans

WAC 173-340-430 (6)(f) Sampling and analysis plan

Since 1986, Reichhold has conducted extensive site-wide characterization efforts. These efforts assessed soil, groundwater, wastes, and sediments. Reichhold has prepared these sampling and analysis plans (SAP) according to specific regulatory requirements and submitted them to EPA and Ecology for review and approval. A list of these sampling efforts is provided in Attachment 2.

Operation of the soil cells involves the repeated placement of contaminated soil, addition of soil amendments, and the initial and subsequent testing of soil to evaluate the rate of treatment and if any, need for additional actions. Specifically, the purpose of sampling is to provide treatment maintenance data and treatment progress information. A SAP has been prepared by Reichhold for the collection of soil samples from the soil cells for verification of treatment progress and to provide information to Ecology for confirmation in the contained-out determination of soils from the cells. A summary of these SAP elements required by MTCA are presented in Attachment 9. Attachment 10 presents a summary of the process through which the constituents of concern have been identified in soil placed in the soil cells.

Additionally, during the implementation of the soil treatment, the vendor collects multiple rounds of discrete samples to monitor the treatment progress and reduction in chlorinated

phenol concentrations. These sample results are used by the vendor to adjust the treatment operation activities such as watering, tilling, and amendment and nutrient application. All sample results, including vendor sample results provided to Reichhold, will be provided to Ecology.

7.0 CAMU Closure

WAC 173-303-646 (5)(a)(iv, vi, vii) CAMU Closure
WAC 173-303-646 (5)(c), (d) Factors considered for closure and post-closure requirements

Reichhold has developed an approach for closing the entire site including the CAMU in a manner protective of human health and the environment such that the site can be redeveloped and again become an asset to the City of Tacoma. Reichhold does not wish to close the facility as a RCRA regulated landfill and therefore, will be striving to achieve soil treatment levels acceptable to Ecology.

As stated throughout, the designation of a CAMU is critical to completing the Tacoma site's RCRA corrective action requirements and returning it to productive use. This approach is consistent with Ecology's stated goal for Reichhold's corrective action order and permit renewal. Since the Reichhold property is an essential component of the Port of Tacoma's and the Puyallup Tribe of Indians' plans for development of a marine terminal, the CAMU closure details will be important.

In order to meet site corrective action requirements Reichhold intends to complete the following prior to closure of the CAMU:

- Treat the soils identified for source removal to enhance the long-term effectiveness of the selected remedial actions.
- Through removal and treatment of the soil source areas, reduce the toxicity, mobility and volume of wastes that will remain in place after closure of the CAMU.
- Minimize the land area upon which any untreated soils will remain.

7.1 Limiting Final Waste Placement

Reichhold intends to treat the soils only within the CAMU. The CAMU currently envisioned (See Figure 1) for the Reichhold site is reduced in size by approximately 40% from the HWMA currently in use at the site. Reichhold will minimize the land area upon which any untreated soils will remain. Reichhold does not wish to close the CAMU as a RCRA regulated landfill and, therefore, will be striving to achieve acceptable soil treatment levels necessary to close the facility.

7.2 Closure of the CAMU to Minimize Future Releases

WAC 173-303-646(5)(a)(iv) Managing wastes after CAMU closure

Source removal

Regulated units at the Tacoma site are being cleaned up by source removal within the CAMU to minimize future releases from these units. Soil cells located within the CAMU

treat the targeted constituents. The Tacoma site will adopt institutional controls to ensure long term protection. Reichhold intends to remove and treat soils so that no waste will remain in place after closure of the CAMU. If any waste needs to remain in place, several engineered controls including engineered covers, pavement, buildings, or other barriers will be adopted. Projected Brownfields redevelopment structures will be designed to co-exist in areas where waste remains in place as a protective measure. During design of redevelopment structures, Reichhold will consider current data regarding subsurface contamination remaining in place. The specifics of these arrangements will need to be developed in cooperation with Ecology after remediation is complete and the extent of waste remaining in place is known.

7.3 Closure Requirements

Some of the site soils targeted for source removal are designated by the RCRA Permit as listed waste code F021. The national capacity for treatment of F021 waste streams is incineration at one facility in Kansas. This offsite treatment option is not reliable because it is typically not operational and is prohibitively expensive. Managing our remediation wastes onsite using a CAMU allows Reichhold to pursue source removal in areas with F-listed soils and treat them to destroy concentrations of related hazardous constituents. After treatment is complete, Reichhold will request a "contained –out" determination from Ecology (and EPA if necessary) at a MTCA Cleanup Level consistent with the long term industrial use and future redevelopment of the site. Attachment 7 describes the soils 'contained-out' procedure as approved by Ecology.

Following the completion of soil treatment within the designated CAMU, if remediation wastes remain, they will be consolidated as needed to facilitate installation of engineering controls (e.g. buildings, pavement, storm water management systems) to support redevelopment. The specific details of the engineering controls to be constructed at the site will be developed in cooperation with Ecology, and will depend on the nature and extent of remediation waste remaining after treatment.

CAMU closure activities will be completed as follows:

- The areas within the Reichhold CAMU that are subject to closure requirements include the RCRA regulated units (former Pentachlorophenol Plant, former Resin Tank Farm, MDA, and CDA). These will be closed to meet the appropriate MTCA cleanup standard (as required by Chapter 173-303 WAC).
- At the time of closure of these units, the Dangerous Waste Regulations will be reviewed (e.g., for the applicability of the "Closure Post-closure Rule" ("Standards Applicable to Owners and Operators of Closed and Closing Hazardous Waste Management Facilities; Post-Closure Permit Requirement; Closure Process) to the units.)
- The remaining areas within the CAMU will be cleaned up to the MTCA Method C industrial standard. This cleanup level is consistent with applicable site cleanup regulations and is the same as that required for the remainder of the site. Closure of

the CAMU to the site industrial standard is appropriate since a CAMU is not a RCRA regulated unit. [3]

- Depending on the end result of the soil corrective actions, closure could include removal and decontamination of equipment devices and structures used for remediation waste management, such as the onsite engineered soil cells.
- The site's zoning and land use is currently industrial and is expected to remain industrial as currently defined by the City of Tacoma.
- Define institutional controls per the MTCA regulations WAC 173-340-440. The institutional controls will consider the end use redevelopment characteristics of the site.
- Use of groundwater beneath the site will be prohibited through the institutional controls.

Closure of the CAMU through these steps will meet the CAMU closure performance standards, including: 1) minimizing the need for further maintenance; and 2) controlling, minimizing, or eliminating areas where waste will remain in place to be protective of human health and the environment. Closure in this manner will also meet the redevelopment goals for the site.

If wastes are to be left in place, Reichhold will submit to Ecology for review and approval, a closure plan meeting the closure requirements of WAC 173-303-646(5)(b)(iv). Closure verification sampling will be preceded by the preparation of a specific SAP that will be submitted to Ecology for approval.

8.0 Timing/Schedule

WAC 173-303-646(5)(a)(v) Expediting timing of implementation

The CAMU will expedite the timing of Reichhold's anticipated remedial actions in several ways:

- It sustains continued source removal actions
- It promotes onsite, permanent treatment of soils instead of offsite disposal

Because some of the site soils targeted under the source removal program are designated by the RCRA Permit as F021, offsite treatment has not (and will not) be a dependable option. As stated earlier, the national capacity for treatment of F021 waste streams is, without fail, unavailable and prohibitively expensive. The CAMU allows Reichhold to pursue source

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[3] A RCRA regulated unit is defined in 40 CFR Part 264.90 as surface impoundments, waste piles, land treatment units, and landfills that received hazardous waste after July 26, 1982. The definition of landfill specifically excludes a CAMU which is defined in 40 CFR Part 260.10 as an area within a facility that is used only for managing remediation wastes for implementing corrective action or cleanup at the facility.

removal in areas with F-listed soils and treat them to destroy concentrations of targeted hazardous constituents.[4]

Our experience has shown that onsite treatment of chemicals of concern are best achieved by consolidating contaminated soil and treating them onsite, but *ex situ*, in areas specifically designed for this purpose. Reichhold has performed an in-situ soil flushing field demonstration (SFFD) project on soils within the former Pentachlorophenol Plant Area per the requirements of the existing RCRA Permit. This demonstration was performed by Reichhold between 1990 and 1994. In agreement with EPA Region 10, it was concluded that the SFFD project was unsuccessful because the *in-situ* conditions limited flushing actions and was inefficient for contaminant removal. Because the SFFD project was unsuccessful, it was also determined that the best and most expedited solution for the remediation of the soils was an ex-situ plan with excavation and onsite remediation. Based on discussions with EPA Region 10, Reichhold designed and constructed the two onsite soil cells within the CAMU. The implementation of this continuing corrective action is consistent with the remedial objectives of both the EPA Corrective Action program and the hierarchy of dangerous waste handling under Ecology Dangerous Waste and MTCA rules. The hierarchy states a preference of permanent treatment over incineration.

Specifically for the innovative biotechnology application to excavated soils within the CAMU, the project began in April 1998. The first 1.5-2.0 feet of soil has been successfully treated to below regulatory levels and will be removed from the cell per the 'contained-out' determination from Ecology. The projected period of performance for treatment of all currently targeted site soils is approximately 10 years. With treatment of each batch of soils, baseline sampling and performance sampling episodes are scheduled throughout the duration of the remediation. Please note this performance period is an estimate and is contingent upon several factors including weather conditions (e.g., temperature) and that the current technology continues to be effective on soil with varying contaminant levels. The schedule may also change if the technical approach is modified because of new treatment opportunities.

In the absence of a CAMU, soil treatment at the Reichhold site would be slower, far more expensive, and would be subject to periodic stoppage as commercial incinerators start and stop their operations. The use of the CAMU clearly expedites the timing of remedial activities at Reichhold.

9.0 Conclusion

In summary, Reichhold has prepared this summary to illustrate the advantages of performing permanent onsite treatment of soil with the use of a CAMU. Authorization of the CAMU to complete RCRA Corrective Action responsibilities in accordance with applicable MTCA Cleanup Regulations and Dangerous Waste Regulations requirements ensures timely completion of soil cleanup, protection of human health and the environment,

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[4] Once this is accomplished, the "contained-out" determination will be submitted to approving agencies.

and it does this in a cost effective manner. All of these features meet Ecology's stated goal for the Tacoma site.

Figure 1

Reichhold Tacoma CAMU Layout

(Insert Figure 1)

Attachment 1

Site Historical Background

(Insert Section B – Facility Description and General Provisions - of the RCRA Permit Renewal Application, dated June 1998)

Inclusion of this section does not infer or imply Ecology's approval of statements in the particular section. This section is included to provide sufficient information to enable Ecology to designate a CAMU in accordance with the requirements of WAC 173-303-646.

Attachment 2

Site Corrective Action History and Plan

(Insert Section J – Corrective Action Program - of the RCRA Permit Renewal Application, dated June 1998)

Inclusion of this section does not infer or imply Ecology's approval of statements in the particular section. This section is included to provide sufficient information to enable Ecology to designate a CAMU in accordance with the requirements of WAC 173-303-646.

Attachment 3

Design Drawings for the Onsite Engineered Soil Cells

(Insert as-built drawings)

Attachment 4

Innovative Technology Evaluation Report

(insert SITE Report for Grace Bioremediation Technologies Daramend)

Attachment 5

Innovative Technology Implementation at Reichhold Tacoma

Innovative Technology Implementation at Reichhold Tacoma

The current technology to be implemented at the Reichhold site consists of a proprietary and patent-pending technology owned by Grace Bioremediation Technologies known as Daramend™. The technology utilizes soil-specific organic products and inorganic amendments such as pH modifiers and nutrients to optimize the activity of microorganisms indigenous to a soil or waste, resulting in natural destruction of organic contaminants (chlorinated phenols). For each soil, Daramend is designed to a specific particle size, with a specific nutrient profile and nutrient release kinetics. No microbial inoculation is required. A wide range of wastes and contaminants have been demonstrated to be amenable to remediation using Daramend. These amendments are composed of natural nonhazardous, solid-phase organic matter. Given the proprietary nature of the Daramend technology, access to the chemical formula for the amendment is restricted.

Before soil was placed in the onsite soil cells, it was screened to remove debris and cobbles greater than 2.5 inches in diameter. Residuals generated from this screening were transferred to the Main Disposal Area. The screened soil was then placed into the onsite soil cells. The soils with the highest levels of contamination were placed nearest to the bottom of the cells. During soil excavation, air and particulate emissions were minimized by watering the dedicated vehicle transfer routes.

Ongoing soil treatment will focus on the upper, uncovered surface of the soil pile with active treatment extending to a depth of 18 inches to two feet. Periodic soil tilling and maintenance of the soil's moisture content are the key maintenance activities.

The amendment will be applied to the surface and blended in the soil using a tractor-driven rotary tiller capable of tilling to depth of two feet. The effectiveness of the treatment technology will be monitored and optimized during the first round of testing using parallel laboratory optimization tests and periodic sampling results. When treatment goals are achieved for all constituents of concern, the uppermost two feet of soil will be stripped from the surface of the soil cell. The underlying two feet of soil will then become the focus of active treatment. The treatment, optimization, and removal process will continue in successive two feet thick lifts as the test progresses until the soil in the cell has been fully treated and remediation goals are achieved.

The process of treating the soil in successive layers provides benefits by allowing the passive treatment of underlying soil due to downward leaching of nutrients and acclimated organisms. Long-term optimization testing and sampling during treatment of successive lifts will provide data to determine the most effective combination of DARAMEND and amendments for certain soil conditions and contaminant concentrations. An additional benefit of excavating and placing the contaminated soil in the cells is that the identified soil source is out of contact with groundwater.

Biological Amendment Application. The initial treatment protocol to be followed during the bioremediation project was derived from the optimum treatment identified during laboratory treatability tests. In general, the treatment is designed to enhance aerobic biodegradation conditions within the soil and increase the bioavailability of PCP. This is achieved through a combination of amending, irrigating, and tilling regimes.

Tilling. Tillage will reduce potential variations in the physical and chemical properties of the soil and facilitate uniform distribution of amendments. The soil surface will be tilled to mix the soil and the amendment prior to baseline sampling activities. During active treatment (the period between approximately May and October when the soil temperatures are appropriate for enhancing biological activity in the soils), the soil will be tilled approximately once every two weeks to incorporate amendments, further homogenize the soil and/or enhance moisture control and aeration. The results of laboratory optimization studies will also influence the tilling schedule.

The tiller will be a 7-ft-wide power take-off-driven rotary tiller and will consistently till to a depth of 2 feet. The tiller will be pulled by a conventional farm tractor with an engine rated at greater than 80 hp. For the most part, the soil being treated will be underlain by at least two feet of soil. To ensure the treatment cell liner is not penetrated during tilling, the tilling will be conducted by personnel well trained in the operation of the tractor and tiller and aware of the need to minimize incorporation of the underlying protective drainage sand layer into the soil being treated.

A 4- to 20-foot-wide margin (depending on height of pile) at the edge of the treatment surface will not be disturbed by tilling so that the slope of the treatment pile and cover remain intact and damage to the treatment cell linings and berms is prevented. Residual untreated soil at the margins of the treatment area will be collapsed into the succeeding treatment layer following removal of remediated soil. Residual soil remaining after treatment of the last layer will be consolidated into one area and treated.

Irrigation. Maintenance of soil moisture within a narrow predetermined range is critical for effective biodegradation of target compounds. Soil moisture content will be maintained below the soil's water holding capacity (WHC) and above the minimum optimal range. Biodegradation can be inhibited by inadequate, biologically available water.

The WHC of the soil in the treatment layer will be determined after the initial addition of the amendments. This parameter, along with the results of bi-weekly soil moisture analysis, will determine the schedule for irrigation of the treatment surface. The irrigation system will be a commercial agricultural system and water will be drawn from the public water supply at the site.

Precipitation and other water that runs off the pile and collects in the treatment cell will be collected in ditches and routed, along with leachate, to the onsite Water Treatment System. The location of the leachate collection areas are shown in Attachment 3.

Performance Evaluation. The effectiveness of this treatment will be monitored and optimized at regular intervals during the project using concurrent laboratory tests and by routine field sampling results. Performance monitoring activities are generally conducted prior to tilling at the beginning of the active treatment period and again at the end of the period. These evaluations assist the vendor in optimizing the technology implementation which determine if additional nutrients, amendments, or moisture are needed to enhance the bioactivity in the soils. When treatment goals are achieved, the uppermost two feet of soils will be stripped from the surface of the soil cell. The underlying two feet of soils will then become the focus of active treatment. The process of treating the soil in successive

layers also may provide secondary benefits by allowing concurrent passive treatment of underlying soils due to downward leaching of nutrients and acclimated organisms.

The treatment, optimization, and removal process will continue in successive two foot thick lifts as the test progresses until the soil pile has been fully treated and remediation goals are achieved. The project performance period for this volume of soil is estimated to require approximately 10 years.

Removal of Soils from the Cells. Reichhold has completed several planning activities to assure that the soil liner is not damaged during removal of the treated soils. During construction of the cells, the bottom elevation of the cells was surveyed after the liner was installed. This information will be used in discussions with contractors who would be removing the soils from the cells under contract with Reichhold. Additionally, when the final layer of soils is available for treatment, Reichhold will consider consolidating those soils in one end of the cell to assure the proper depth for tilling activities. This will prevent damage to the liner from the final rounds of tilling activities.

Attachment 6

Description of Site Hydraulic Containment System

(Insert Section E – Groundwater Monitoring - of the RCRA Permit Renewal Application, dated June 1998)

Inclusion of this section does not infer or imply Ecology's approval of statements in the particular section. This section is included to provide sufficient information to enable Ecology to designate a CAMU in accordance with the requirements of WAC 173-303-646.

Attachment 7

Soils 'Contained-in' Determination Procedures

(Insert letter from Ecology – anticipated to be issued mid-September 2000)

Attachment 8

Site Health and Safety Plan

This Health and Safety plan was included to meet the requirements of WAC 173-340-810(2).

Attachment 9

Soil Cells Sampling and Analysis Plan Summary

Soil Sampling and Analysis Plan Summary – Onsite Soil Cells

Introduction

As part of the Reichhold's CAMU Determination , Ecology has requested information regarding the characterization of ongoing, *in situ* soil remediation underway at the Tacoma site. The following information is a summary of the practices detailed within Reichhold's sampling and analysis plan for the onsite soil treatment cells.

Sampling Purpose and Objectives

Since 1998, the Reichhold Tacoma site has been conducting onsite remediation of soils which are designated by the RCRA Permit to contain RCRA-listed waste F021 . The *in situ* remediation for these constituents involves the application of an innovative, patented biological amendment to the soils which have been placed in the two onsite engineered soil cells. This soil amendment technology is effective in the reducing chlorinated phenolic compounds. A Sampling and Analysis Plan (SAP) was prepared to specify the field sampling activities of the two soil treatment cells located at the Tacoma site. The SAP was prepared in general conformance with standard sampling documentation procedures and to reflect the requirements of WAC 173-340-820.

As described in the SAP, sampling will be conducted throughout the duration of this innovative technology project. The purpose of sampling is to provide verification that:

1) the technology is effective in reducing concentrations of chlorinated phenols in the soils, and

2) the chlorinated phenol concentrations in soils are below applicable regulatory levels necessary to achieve the "Contained-out determination' by Ecology

3) to verify that other constituents of concern meet appropriate clean-up levels.

The objective of treatment cell soil characterization is to demonstrate that the relevant soil contaminant concentrations have met regulatory levels and therefore, treated soil can be removed from the cells. Soil that is removed can be placed onsite and treatment may proceed on the next horizon of soils within the cells.

The following information has been excerpted from the 1998 SAP to supplement the CAMU determination requested by Ecology.

Project Organization

Reichhold is responsible for the overall project management of the innovative technology soils project. CH2M HILL is contracted to assist Reichhold with the collection of soil samples from the onsite soil cells.

Project Schedule

The application of the biological amendment to the first horizon of soils in the soil cells began in 1998. Soil sample collection for this project began with a baseline sampling event. Baseline sampling is conducted approximately one week before and approximately one week after the initial incorporation of the soil amendments. The verification sampling will be conducted at the end of the treatment cycle. The results of the baseline and verification sampling events will be reported to Ecology for the contained-out determination. Additional sampling episodes may be conducted throughout the soil treatment cycle by either Reichhold or the technology vendor. These sampling events are for the purposes of optimization of the technology.

The actual project schedule is dependent on the success of the technology. It is roughly estimated that it will take approximately 2-3 years to treat each horizon of soil (a depth of 1.5 -2.0 feet). Based on this, the project is expected to last approximately 10 years with baseline and verification sampling scheduled for every 2-3 years.

Sample Methodology

A systematic, random sampling approach has been implemented to obtain samples which are representative of current soil conditions in the horizon undergoing treatment. Sample size takes into account several considerations including randomness, representativeness of the size of the treatment area, and the cost to analyze samples. The depth of soils to be sampled is approximately 1.5-2.0 feet, the estimated effective treatment zone as described below.

Each cell is divided into relatively proportionate areas or "zones", measuring approximately 100 feet on a side. This division yields a grid sampling intensity of approximately 50-ft centers. The interior surface area of the cell determines the number and dimensions of the zones. Based on this, Cell 3 is divided into four zones and Cell 4 into two. Each zone is subdivided into sixteen zones or "subzones". Each zone is designated by a letter and each subzone is designated by a number (see Figure 1).

Using a random number generator, five subzones from each zone are randomly selected for sampling. Subzones are randomly selected using a random number generator, ranging from 1 to 16. Replicate numbers or subzones are discarded and a subsequent number generated until five discrete subzones are selected.

Sample cores are collected from the center of each of the zone's five subzones. The interval or depth of the sample corresponds to the soil horizon undergoing active treatment. Currently, all five cores are to be submitted to the laboratory for analysis. Reichhold is reviewing information with Ecology to demonstrate that there is limited variability in the results of baseline and verification sampling. Subsequent to this review, Ecology may approve limited compositing of samples from each zone for laboratory analysis. The sample grids and their corresponding designations are presented as Figure 1.

Site Sampling

Aerial Grid Placement and Construction

Prior to sampling, temporary reference grids are constructed over each cell. Using nylon twine, attached to wooden stakes at predetermined locations, the aerial reference grid is strung above the contents of each cell, oriented and dimensionally consistent with the sampling grids presented in Figure 1.

Each zone is designated by a letter and its subzones a number. In this manner, Cell 3 was segregated into four zones A, B, C, and D and Cell 4 into two zones A and B, and each of their subzones were then assigned sequential numbers from one up to sixteen.

Sample Collection

Using a hand auger, soil samples are collected from the interval corresponding to the treatment horizon. In Cell 3 and Cell 4, this horizon ranges from 1.5 to 2.0 feet below ground surface. The treated horizon is readily identified by the difference in consolidation of the upper and lower horizons or the tillage depth.

Samples are collected and handled only by personnel familiar with standard sampling and collection procedures. Whenever possible, disposable sampling equipment is used. All non-disposable sampling equipment is constructed of stainless steel and decontaminated either before use and or between zones and cells according to the procedure stated herein. Disposable sampling equipment is not reused and is decontaminated before being disposed.

Equipment Decontamination

Decontamination of non-disposable sampling equipment is as follows:

- wash equipment using a solution of phosphate-free detergent/potable water
- fresh water rinse
- rinse equipment using deionized water
- rinse with isopropyl alcohol
- rinse with deionized water

Equipment is immediately used or wrapped in aluminum foil after air drying, if possible.

Sample Collection and Management

Collection and Identification

Samples are collected in "clean-certified" containers, as supplied by the contracted analytical laboratory, and sealed with Teflon®-lined lids. After they are collected, samples are temporarily stored in ice chest and preserved by either ice or gel-packs, appropriately contained to prevent inadvertent leakage.

Each sample, collected specifically for evaluatory purposes is assigned a sample-specific identifier (sample ID) that corresponds to the cell, zone, sample depth, and the sample year.

Labels are affixed with water-resistant labels and secured with clear tape placed directly over the label and contain the following information:

- Reichhold-Tacoma Facility

- Sample-specific sample ID
- Sampler's initials
- Date the sample was collected
- Requisite sample analysis

Once completed, samples are packaged and shipped to the contract laboratory as discussed below.

Packaging and Shipment

Laboratory supplied chain-of-custody forms are appropriately filled out and accompany each shipping container submitted to the contracted laboratory.

Samples submitted to the laboratory are shipped via Fed-Ex (or other express courier) at the end of each sampling day.

The samples are packed for shipment is as follows:

- Samples wrapped or bagged in a manner to prevent breakage and placed inside Ziploc®–type plastic bags
- Sufficient quantities ice or gel-packs to maintain required preservation temperature and double–bag to minimize likelihood of leakage
- Sample chain-of-custody, appropriately filled out is placed in plastic bag attached to inside of cooler lid
- Attach custody seals (front and back of container) and tape over custody seals with fiber-reinforced tape
- Hand deliver ice chest to "manned" Fed-Ex drop-off for overnight (am) delivery

Sample Analysis

Samples collected as parts of this project are submitted to a lab certified by Ecology for the requisite constituent analysis. Samples are analyzed using USEPA approved methods for semivolatile organic compounds which represent target constituents for the site (chlorinated phenols and PCB–Aroclor 1248). In addition, Ecology will review historical process knowledge and analytical data submitted by Reichhold to determine if all potential constituents of concern have been identified. Upon completion of Ecology's review, Ecology and Reichhold will agree on a list of site constituents of concern. Reichhold will subsequently analyze all samples collected under this SAP for these site constituents. Analysis of indicator parameters in lieu of specific constituents may be approved by Ecology if Reichhold demonstrates that these parameters can provide accurate information on the effectiveness of treatment.

The semivolatile constituents as well as the corresponding analytical requirements are located in Table 1. This table will be modified if additional constituents of concern are added as a result of review with Ecology.

TABLE 1

Analytical Parameters and Methods
Reichhold, Inc.
Tacoma, Washington

Sample Matrix	Parameter[1]	Analytical Method	Container[2]	Preservation	Holding Time
Soil	Pentachlorophenol 2-Chlorophenol 2, 4-Dichlorophenol 2, 4, 6-Trichlorophenol Total chlorophenols	8270	One, 8 oz Glass Teflon-lined Lid	4°C	14 days until extraction 40 days after to analysis
	Aroclor 1248	8080			
Water[3]	Same	Same	Two 1-liter amber bottles Teflon-lined lid	Same	7 days until extraction 40 days after to analysis

Notes:
1) target analytes identical for both Cell 3 and Cell 4 samples.
2) sample volume sufficient to conduct both respective analyses.
3) water samples collected only for QA/QC purposes (equipment rinsate).

Quality Assurance and Quality Control Samples

Two types of quality control samples will be taken as part of the quality assurance/quality control program for this project: 1) field equipment blanks, and 2) matrix spike/matrix spike duplicates (MS/MSD).

Field Equipment Blanks

One set of equipment blank samples (equipment reinstate) will be collected for every ten soil samples or one per day of sampling. An equipment blank is prepared by pouring distilled over the decontaminated sampling device and collecting the rinsate into two, 1–liter amber glass sample bottles. Equipment blank samples will be recorded in the field notebook.

Matrix Spike/Matrix Spike Duplicates

Matrix spike/matrix spike duplicates (MS/MSD) samples are laboratory QA samples that are used to test matrix interference effects on laboratory analyses. One MS/MSD is analyzed during each sample collection event. Additional sample volume is not required for soil samples by the laboratory to conduct MS/MSD analyses. The decision on which sample is selected for conducting MS/MSD analyses can be made by the laboratory at the time of sample analysis.

Data Reporting

Analytical results from sample analysis will be submitted to Ecology for use in the contained-out determination for the treated horizon of soil.

Attachment 10

Process of Determining the Site Constituents of Concern

Process of Determining the Site Constituents of Concern

Ecology will review historical process knowledge and analytical data submitted by Reichhold to determine if all potential constituents of concern have been identified. Upon completion of Ecology's review, Ecology and Reichhold will agree on a list of site constituents of concern. Reichhold will subsequently analyze all samples for these site constituents. Analysis of indicator parameters in lieu of specific constituents may be approved by Ecology if Reichhold demonstrates that these parameters can provide accurate information on the effectiveness of treatment.

As background to that discussion, Reichhold has prepared this section as a summary of the process conducted to date at the site under RCRA to define the site constituents.

As part of the first Tacoma site characterizations to support groundwater and soils investigative efforts, Reichhold Chemicals, Inc. investigated and reported to Ecology and EPA the following:

- types of products and potential byproducts manufactured at the Tacoma site, and
- the specific areas of industrial activities including waste disposal.

These investigations included interviews with knowledgeable staff, records reviews, and field surveys of the site. on July 30, 1986, in fulfillment of Item Number 6 of the RCRA 1986 Consent Agreement and Order (No. 1086-04-33-3008), Reichhold submitted this information to both EPA and Ecology.

In September 1986, Reichhold further refined the July response and submitted an even more detailed evaluation to the agencies (Reichhold Chemicals, Inc. Technical Memorandum submitted to U.S. Environmental Protection Agency and Washington Department of Ecology. Re: *Analysis Parameters and Methods for Reichhold Tacoma Facility (Replacement for Indicator Parameters—Memorandum dated July 30, 1986.* Prepared by CH2M HILL September 5, 1986). The September technical memorandum described the rationale for selecting the analytical parameters to investigate the site, more precisely, to undertake the comprehensive *Preclosure Investigation and Closure/Post Closure Workplan and Hydrogeologic Investigation Workplan* (prepared by CH2M HILL August 1986). Chemicals ultimately recommended for analyses of soil and groundwater were selected based on the following screening procedures:

1. Review general site history and activities conducted at Tacoma site since start-up
2. List chemicals required for each product manufactured
3. List chemicals for all processes, activities including formula variations
4. Identify potential byproducts
5. Correlate these chemicals to RCRA Appendix VIII and IX lists
6. Submit lists to agencies for review and approval

The following suite of chemicals were identified:

Groundwater – Organic priority pollutants (volatiles, semivolatiles, pesticides, and PCBs), RAS compounds established by EPA's Contract Laboratory Program (CLP), Inorganics [Calcium, iron, aluminum, sodium, cobalt, lead, potassium), and specialty organics associated with the site's history (2-chlorophenol, phenol, styrene, parabenzoquinone, acetone, vinyl acetate, 2,3,7,8-tetrachlorodibenzo-p-dioxin, dibenzofuran, and di-,tri-, and pentachlorophenol), TOX, TOC, pH, specific conductivity, and miscellaneous water treatment chemistry (e.g., carbonate, bicarbonate, chloride, COD, TDS, etc.).

Soil - Organic priority pollutants (volatiles, semivolatiles, pesticides, and PCBs), RAS compounds established by EPA's Contract Laboratory Program (CLP), Ecology State Dangerous Waste Designation Tests (fish bioassay, Total Halogenated Hydrocarbons, corrosivity, reactivity, ignitability, and EP toxicity), inorganics (lead), parabenzoquinone, 2,3,7,8 tetrachlorodibenzo-p-dioxin. To these lists EPA added molybdenum and Ecology added pentachlorophenol and cyanide in soil.

It is important to note that the selection of site characterization chemicals occurred concurrent with the plant shut-down and termination of manufacturing (from 1985 to 1990). Consequently, no new production processes or raw materials were used, so the list remained representative of the site history.

Since 1986, Reichhold has conducted two main investigations on the soils at the facility: 1) the 1987 Preclosure Investigation and 2) the 1994 Soils Characterization project. Hundreds of soil samples have been collected at the site through these investigations and analyzed for the established list of constituents. The information gathered and documented in these reports have resulted in non-detect or very low detections for constituents other than chlorinated phenols and PCBs (Aroclor 1248). Therefore, these two constituent groups represent the constituents of concern in the soils that have been targeted for placement in the soil cells at the facility.

Based on these efforts, this list of constituents of concern for the Tacoma site are believed to be representative and complete.